dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on 15 dates; between the 55th and 65th meridians on 4 dates; and west of the 65th meridian on 1 date. Compared with the corresponding month of the last 2 years the dates of occurrence of fog near the Grand Banks numbered 2 less than the average; between the 55th and 65th meridians 5 less than the average; and west of the 65th meridian 8 less than the average. On the dates for which fog was reported near the Grand Banks it occurred with the approach or passage of general storms, save on the 15th when high pressure and westerly winds prevailed. On the dates fog was reported west of the 55th meridian it occurred with the approach or passage to the northward of general storms. On the 4th, 5th, 6th, 12th, 14th, 16th, and 26th dense fog was reported at points along the Atlantic coast north of New Jersey by observers of the Signal Service, its occurrence attending the passage of general storms eastward from the Lake region.

OCEAN ICE IN SEPTEMBER.

The table shows that for September, 1890, ice was reported about 1° south and about ½° east of the average southern and eastern limits of ice for the month, as determined from reports of the last 7 years. The southernmost ice noted in the table for the current month, a large iceberg observed on the 30th in the position given, was over ½° farther south than the southernmost ice reported for September of preceding years, and the easternmost ice reported for the current month, 2 icebergs observed on the 8th in the position given, was about ½° east of the average eastern limit of ice for September. Ice was reported most frequently and in the greatest quantity in and east of the Straits of Belle Isle and along the east edge of the Banks of Newfoundland, and it exceeded the average amount reported for the corresponding month of previous years. The limits within which icebergs and field ice were reported for September, 1890, are shown on chart I by ruled shading.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for September during the last 8 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
September, 1883.....	48 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	46 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	48 40	46 27
September, 1886.....	46 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	40 50	September, 1887.....	45 37	40 50
September, 1888.....	Off Cape	Race.	September, 1888.....	53 00	52 08
September, 1889.....	46 21	48 22	September, 1889.....	48 59	46 48
September, 1890*.....	45 30	48 00	September, 1890*.....	50 30	46 22
Mean.....	46 30	47 58	Mean.....	48 42	46 57

*On the 4th a large lump of ice 100 feet long and 6 feet above water was reported in N. 36° 49′, W. 42° 18′; this is the lowest latitude in which ice was ever reported in the north Atlantic Ocean.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for September, 1890, is exhibited on chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the lower Colorado and lower Gila valleys, where it was above 85, and at stations in that region the mean value was above 90. The mean temperature was above 80 at Rio Grande City, Tex., and Key West, Fla. North of a line traced from the Va. coast irregularly westward to the southeast slope of the Rocky Mountains, thence southwest to the middle Rio Grande valley, and thence northwestward to the upper Sacramento valley, and east of this line continued southward inside the coast line to the Cal. coast in about latitude N. 34°, the mean temperature was above 70. The mean temperature was lowest at elevated stations in central Colo., at stations in the British Possessions north of Mont., N. Dak., and the Lake region, and in the lower Saint Lawrence valley, where it fell to or below 50.

The mean temperature was generally below the normal east of the Rocky Mountains, and on the Pacific coast between the 35th and 43d parallels and north of the 46th parallel. The month was warmer than the average September in eastern Me. and the Canadian Maritime Provinces, in N. C. and south Va., at Jacksonville, Fla., Rio Grande City, Tex., and over the plateau regions. The greatest departures below the normal temperature were noted in an area extending from the west part of the lower lake region to east Kans. and Ind. T., where they exceeded 4, and the most marked departures above the normal temperature were reported at stations in eastern Nova Scotia and New Brunswick, N. C., and Ariz., where they were 2, or more.

At stations in the middle and lower Mississippi and Red River valleys, and south Fla., the month was the coldest, and at Fort Apache, Ariz., it was the warmest September on record.

The warmest September east of the Rocky Mountains occurred in 1881, when the departures above the normal ranged above 8 in the lower lake region; between the Mississippi River and the Rocky Mountains and south of the Dakotas in 1884, when the excess in temperature was more than 5; and generally over the Rocky Mountain and plateau regions and on the Pacific coast in 1888, when the temperature was more than 5 above the normal over the northern plateau region and on the north Pacific coast. The coolest September in the middle Mississippi and Red River valleys, and at Key West, Fla., occurred in 1890, when the temperature was more than 4 below the normal in the first named regions and 2.7 below at Key West, Fla. In the Atlantic coast states from New York to Georgia the coldest September was that of 1871; in the middle Ohio valley and thence over the west part of the lower lake region in 1879, when the departures below the normal temperature were more than 4; in the extreme northwest in 1881, when the temperature was 4 to 5 lower than usual; and over the middle and northern plateau regions and on the middle Pacific coast in 1884, when the deficiency in temperature was 4 to 5. From the foregoing it will be seen that in 1881, when the month was the warmest on record east of the Mississippi River, it was the coldest September noted for the extreme northwest; and that in 1884, when it was the warmest September recorded for stations between the Mississippi River and the Rocky Mountains and south of the Dakotas, it was the coldest on record over the middle and northern plateau regions and on the north Pacific coast.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for September for a series of years; (2) the length of record during which the observations have been taken, and from which the normal

has been computed; (3) the mean temperature for September, 1890; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for September, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Mean for Sept., 1890.	(4) Departure from normal.	(5) Extreme monthly mean for Sept.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	70.7	9	68.5	— 2.2	76.4	1884	67.5	1883
California.									
Sacramento	Sacramento	68.8	36	62.2	— 6.6	76.0	1853	61.9	1884
Connecticut.									
Middletown	Middlesex	60.7	22	61.1	+ 0.4	63.8	1870	52.4	1871
Florida.									
Merritt's Island	Brevard	79.9	8	78.0	— 1.9	82.5	1882	78.0	1890
Georgia.									
Forsyth	Monroe	76.5	16	75.1	— 1.4	82.2	1884	72.8	1888
Illinois.									
Peoria	Peoria	66.9	34	64.1	— 2.8	73.4	1865	60.2	1866
Riley	McHenry	60.7	24	57.9	— 2.8	68.4	1865	56.4	1888
Indiana.									
Vevay	Switzerland	68.4	24	66.1	— 2.3	76.3	1881	63.0	1869
Iowa.									
Cresco	Howard	58.7	17	55.8	— 2.9	64.3	1877	54.3	1873
Monticello	Jones	61.4	36	58.2	— 3.2	73.1	1865	51.0	1856
Logan	Harrison	65.0	16	63.8	— 1.2	70.2	1886	61.3	1876
Kansas.									
Lawrence	Douglas	66.9	27	63.0	— 3.9	71.2	1886	61.8	1868
Wellington	Sumner	68.9	11	69.8	+ 0.9	74.5	1884	63.8	1883
Louisiana.									
Grand Coteau	Saint Landry	77.8	7	74.7	— 3.1	81.6	1884	74.7	1890
Maine.									
Orono	Penobscot	56.7	20	57.9	+ 1.2	60.5	1889	52.4	1873
Maryland.									
Cumberland	Allegany	62.1	31	63.2	+ 1.1	70.0	1881	55.7	1863
Massachusetts.									
Amherst	Hampshire	60.2	54	59.4	— 0.8	67.4	1881	50.9	1858
Newburyport	Essex	60.5	12	60.9	+ 0.4	64.4	1884	57.0	1888
Somerset	Bristol	64.4	18	65.6	+ 1.2	69.2	1881	61.6	1885
Michigan.									
Kalamazoo	Kalamazoo	61.9	14	60.4	— 1.5	69.0	1881	55.2	1879
Thornville	Lapeer	62.0	13	58.6	— 3.4	71.0	1881	57.8	1879
Minnesota.									
Minneapolis	Hennepin	58.2	25	56.0	— 2.2	67.7	1865	49.9	1868
Montana.									
Fort Shaw	Lewis & Clarke	56.0	22	56.8	+ 0.8	61.3	1867	43.2	1873
New Hampshire.									
Hanover	Grafton	56.9	54	57.3	+ 0.4	62.9	1881	50.3	1848
New Jersey.									
Moorestown	Burlington	65.2	27	64.9	— 0.3	73.6	1881	60.6	1871
South Orange	Essex	63.5	20	62.6	— 0.9	71.8	1891	53.0	1871
New York.									
Cooperstown	Otsego	55.4	36	57.1	+ 1.7	66.7	1881	53.3	1860, '63
Palermo	Oswego	58.9	30	57.9	— 1.0	65.1	1881	54.5	1883
North Carolina.									
Lenoir	Caldwell	65.0	18	67.9	+ 2.9	71.1	1884	55.2	1878
Ohio.									
N'th Lewisburgh	Champaign	64.3	58	63.9	— 0.4	73.0	1881	55.0	1835
Wauseon	Fulton	62.5	20	59.1	+ 6.6	71.1	1881	57.2	1883
Oregon.									
Albany	Linn	60.9	12	61.1	+ 0.2	64.7	1888	53.3	1884
Eola	Polk	59.6	20	60.6	+ 1.0	65.3	1876	51.2	1881
Pennsylvania.									
Dyberry	Wayne	58.1	23	56.4	— 1.7	66.9	1881	52.5	1871
Grampian Hills	Clearfield	60.4	26	59.6	— 0.8	72.0	1881	54.2	1871
Wellsborough	Tioga	59.1	11	56.6	— 2.5	73.8	1881	52.3	1883
South Carolina.									
Statesburgh	Sumter	72.7	9	70.9	— 1.8	77.9	1881	69.9	1888
Tennessee.									
Austin	Wilson	71.9	19	71.4	— 0.5	78.2	1881	67.6	1875
Texas.									
New Ulm	Austin	77.4	18	76.1	— 1.3	81.0	1872	74.6	1889
Vermont.									
Strafford	Orange	59.7	17	59.0	— 0.7	64.4	1879	56.2	1876
Virginia.									
Birdsnest	Northampt'n	70.9	21	71.2	+ 0.3	79.1	1881	61.2	1877
Washington.									
Fort Townsend	Jefferson	57.4	15	56.4	— 1.0	63.5	1874	53.9	1884
Wisconsin.									
Madison	Dane	61.0	13	57.5	— 3.5	65.3	1854	57.5	1890

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 110, at Yuma, Ariz., on the 4th. The maximum temperature rose above 100 in the Colorado Valley from south Nev. southward, in the Gila Valley, and in southeast Cal. to the upper San Joaquin valley. The maximum temperature was above 90 south of a line traced from the south Atlantic coast northwestward to extreme northwest N. Dak., save along the immediate Gulf coast east of Corpus Christi, Tex., east of this line traced southward to the Rio Grande Valley, over the extreme southern and the southwest parts of the plateau region, and in the interior of Cal. in the Sacramento and San Joaquin valleys. The lowest maximum temperature, 64, was reported at Tatoosh Island, Wash.; at Eureka, Cal., the maximum temperature was 69. The reports of United States Army post surgeons and voluntary observers show the following maximum temperatures in states and territories where temperature rising to or above 100 was reported: Volcano Springs, Cal., 122; Gila Bend (2), Ariz., 116; Gove City, Kans., 105; Fort Ringgold, Tex., and Kennedy, Nebr., 103; Milan (2), Tenn., Saint George, Utah, Bennet, Colo., Cameron, La., and Fenelon, Nev., 100. Among high temperatures noted at regular stations of the Signal Service for September of preceding years are: 100 at New Haven, Conn., New York City, and Boston, Mass.; 101 at Sandy Hook, N. J., Baltimore, Md., Pittsburgh, Pa., Saint Louis, Mo., and North Platte, Nebr.; 102 at Philadelphia, Pa., and 104 at Washington City, all in 1881; 106 at Rio Grande City, Tex., in 1877; 100 at Fort Buford, N. Dak., and 101 at Leavenworth, Kans., in 1882; 107 at Fort Sully, S. Dak., in 1874; 102 at Fort Supply, Ind. T., in 2 or more years; 104 at El Paso, Tex., and 113 at Yuma, Ariz., in 1879; 112 at Fort McDowell, Ariz., in 1885; 114 at Phœnix, Ariz., in 1883; 100 at Boise City, Idaho, and 102 at Ashland, Oregon, in 1888.

The lowest temperature reported by a regular station of the Signal Service was 24, at Fort Washakie, Wyo., on the 12th. The minimum temperature was below 30 over a greater part of the northern and middle plateau regions, and thence eastward to the north part of the upper lake region, and in northern N. H. and Vt., and the minimum temperature was below 40 north of a line traced from the south New England coast south of west to N. Mex., thence north of west to east-central Cal., and east of this line continued west of north to the coast of northwest Wash. The highest minimum temperature, 70, was noted at Key West, Fla., and the minimum temperature was above 60 over the Florida Peninsula, and the adjoining parts of western Ariz., southern Nev., and southern Cal. The reports of United States Army post surgeons and voluntary observers show the following minimum temperatures in states and territories where temperature falling to or below 32 was reported: 7 at Climax, Colo.; 10 at Blackfeet Agency, Mont.; 11 at Bonanza, Idaho; 18 at Fort Niobrara, Nebr., and Steele, N. Dak.; 19 at Roscommon, Mich.; 20 at Lakin and Luray, Kans., Berlin Mills, N. H., Aberdeen, S. Dak., and Camp Sheridan, Wyo.; 22 at Utica, N. Y.; 23 at Atlantic, Iowa, Beulah, Oregon, Haywood and Neillsville, Wis.; 24 at Medford and Pokegama Falls, Minn., and Lake Cochituate, Mass.; 25 at Fort Sheridan, Ill., Dyberry, Pa., Nephi, Utah, and Vancouver Barracks and Watervale, Wash.; 27 at Adrian, Mo., and Jacksonville, Vt.; 28 at New Hartford (1), Conn., Fort Union, N. Mex., and Dale Enterprise, Va.; 30 at Willow (2), Cal., and Fairfield, Me.; 31 at Point Isabel, Ind., and Lordstown, Ohio; 32 at Fort Supply, Ind. T., and Halleck, Nev.

At the following-named stations of the Signal Service the minimum temperature was as low or lower than previously reported for September: Key West, Fla., 20 years record, 70, the same as 1886; Pensacola, Fla., 11 years, 54, the same as 2 or more years; New Orleans, La., 20 years, 56, the same as 1888; Galveston, Tex., 20 years, 56, 1 below 2 or more years; San Antonio, Tex., 12 years, 46, 4 below 1887; Palestine, Tex., 9 years, 47, 2 below 1883; Brownsville, Tex., 15 years, 55, the same as 1889; Rio Grande City, Tex., 14 years, 52, 1 below 1883; Oswego, N. Y., 20 years, 36, the same as 2 or more years; Springfield, Ill., 12 years, 36, the same as 1888; Valentine, Nebr., 6 years, 27, 2 below 1888; Huron, S. Dak., 10 years, 25, 1 below 1887; Fort Custer, Mont., 12 years, 29, the same as 1880; Helena, Mont., 10 years, 26, 2 below 1889; Fort Elliott, Tex., 10 years, 35, 2 below 1888; Keeler, Cal., 6 years, 50, the same as 2 or more years; Tatoosh Island, Wash., 7 years, 40, 1 below 1889.

LIMITS OF FREEZING WEATHER.

The southern and western limits of freezing weather are shown on chart II by a line traced from northern Mich. south of west to extreme north central N. Mex., thence northward to

west-central Colo., thence westward to west-central Nev., and thence northward to northern Idaho. A line indicating the southern limit of freezing weather is also traced over northern N. H. and Vt.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of Signal Service data. The greatest monthly ranges of temperature occurred in the upper Missouri valley, where they exceeded 60, whence they decreased eastward to less than 30 on the south New England coast, and at stations on the immediate middle and south Atlantic coasts, southeastward to less than 19 over extreme southern Fla., and to less than 30 on the middle Gulf coast, southward to less than 40 in southeast Ariz., and southwestward and westward to less than 30 at stations along the immediate Pacific coast.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for September, 1890:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
	°	°	°	°	°
Boston, Mass	65.5	57.0	8.5	63.0	62.9
Canby, Fort, Wash	63.4	54.0	9.4	58.2	55.4
Charleston, S. C	84.6	76.0	8.6	81.4	76.2
Eastport, Me	53.6	51.0	2.6	52.9	57.0
Galveston, Tex	86.0	69.5	16.5	82.3	77.8
Key West, Fla	87.8	82.8	5.0	85.8	80.3
Nahant, Mass	64.0*	53.0*	11.0	59.4*	61.4
Portland, Oregon	67.8	61.8	6.0	64.5	62.4

* Four days missing.

FROST.

The following special reports of frost have been made by regular and voluntary observers of the Signal Service: 1st.—The first killing frost of the season occurred at Grampian Hills, Pa., and the first light frost at Baker City, Oregon. 2d—The first light frost occurred at Centreville, Cal., this was reported as the first frost that had occurred in Alameda Co., Cal., on that date since 1853, and the first light frost was reported at Winnemucca, Nev. 4th.—The first killing frost at Como, Colo. 6th.—The first killing frost occurred at Baker City, Oregon, and Stamford and Villa Grove, Colo. 7th.—The first light frost occurred at Montrose, Colo., and Rapid City, S. Dak., and the first killing frost at Taylor's Ranch, Utah; Georgetown, Greenhorn, La Veta, Moraine, and T. S. Ranch, Colo. 8th.—The first killing frost occurred at Montrose, Fort Collins, Como, Fruita, Husted, Longmont, Monte Vista, Pagosa Springs, and Parachute, Colo.; Fort Washakie, Wyo.; and Moorhead, Minn.; the first light frost at Luray and Wakefield, Kans.; Crete and Weeping Water, Nebr.; Colorado Springs, Colo.; Atlantic and Fayette, Iowa; frost injured vines and corn at Cresco, Iowa. 11th.—The first killing frost at Fort Assiniboine, Mont., and Marquette, Nebr. 12th.—Killing frost at Fort Buford, N. Dak., and the first killing frost at Fort Custer and Choteau, Mont.; Kennedy, Nebr.; Walla Walla, Wash.; and Carroll, Iowa. 13th.—The first killing frost of the season occurred at Carrollton, Fayette, Oregon, Kidder, and Pickering Mo.; Fremont, Independence, Manhattan, Salina, Sedan, Allison, Cunningham, and Wakefield, Kans.; De Soto, Fremont, Genoa, Harvard, North Loup, Weeping Water, Crete, and Valentine, Nebr.; Davenport, Des Moines, Atlantic, Iowa City, Osage, Oskaloosa, Hampton, Larrabee, Logan, West Bend, Alta, Fayette, and Carson, Iowa; Huron, Woonsocket, Wolsey, and Kimball, S. Dak.; New England City, N. Dak.; Colorado Springs, Castle Rock, Julesburgh, Morrison, and Eagle Farm, Colo.; Hudson, Mich., and Koepenick, Wis.; the first light frost at Concordia, Dodge City, Leavenworth, La Harpe, and Lawrence, Kans.; Storm Lake, Washington, Dubuque, Keokuk, Amana, Clinton, McCausland, Mount Vernon, and Muscatine, Iowa; Grand Pass, Marshall, Stellada, Wither's Mill, Columbia, and Kansas City, Mo.; Lincoln and North Platte, Nebr.; La Crosse, Wis.; Saint Paul, Minn.; Springfield, Oswego, and South Evanston, Ill.

14th.—Killing frost occurred in the middle and northern sections of Ohio. The first killing frost occurred at Birmingham, Mich., and the first light frost at Cincinnati, Toledo, North Lewisburgh, Wauseon, and Westerville, Ohio; Louisville, Ill.; Indianapolis, Ind.; Earlington, Ky.; and Thon, Colo. 16th.—The first light frost at Duluth, Minn. 17th.—The first killing frost occurred at Manistee, Mich., and the first light frost at Green Bay, Wis. Heavy frost occurred in parts of eastern Wisconsin. 18th.—The first light frost occurred at Asheville, N. C. 19th.—The first killing frost occurred at North Platte, Nebr.; Crook, Le Roy, and Sterling, Colo.; and Saint Lawrence, S. Dak. Killing frost occurred at Fort Sully, S. Dak. 20th.—Killing frost occurred at Fayette, Iowa, and the first killing frost at Green Bay, Wis. 22d.—The first light frost occurred at Albany and Number Four, N. Y.; Manchester, N. H.; and Salem Corners, Pa. 23d.—First killing frost at Rocky Ford and Las Animas, Colo. 24th.—The first killing frost occurred at Farmington, Me., and East Canterbury, N. H., and the first light frost, and, in places, the first killing frost, in northern New Jersey. Killing frost occurred at Marquette, Mich., and the first heavy frost in York Co., Pa. 25th.—The first hard frost occurred generally in New England. The first killing frost occurred at Buffalo, Oswego, Humphrey, Ilion, New Lisbon, Number Four, and Palermo, N. Y.; Dyberry, Le Roy, Quakertown, and Salem Corners, Pa.; Northfield, Vt.; Manchester, Berlin Mills, and Nassau, N. H.; North Billerica, Mass.; Thornville, Mich.; and Rifle Falls, Colo., and the first light frost at Eastport and Portland, Me.; Milton, Mass.; Voluntown and New London, Conn.; Rochester, N. Y.; Moorestown, Readington, Gillette, Junction City, Madison, Trenton, and Locktown, N. J.; Westtown, Pa.; and Buckhannon, W. Va. Light frost occurred at Detroit and heavy frost at Alpena, Mich. 27th.—Killing frost occurred at Sault de Ste. Marie, Mich., and the first killing frost at Saint Paul, Minn. 28th.—Killing frost occurred at Fayette and Cedar Rapids, Iowa. The first killing frost occurred at Dubuque and Amana, Iowa; Grand Haven and Manton, Mich.; Duluth, Minn.; Columbia, Mo.; Westerville, Ohio; Blue Knob and Tipton, Pa.; and the first light frost occurred at Columbus, Ohio; Pittsburgh, Pa.; Chicago, Ill.; and Port Huron, Mich. The heaviest frost of the month occurred in Michigan. 29th.—The first killing frost occurred at Port Huron, Mich.; Concordia, Kans.; Lordstown, Ohio; Rochester, N. Y.; and Corry, Pa.; and the first light frost at Harrisburg and Erie, Pa., and Springfield, Mo. 30th.—The first killing frost occurred at points in northern New Jersey.

Compared with the average date of first killing frost in the respective localities, the killing frost of the 12th in north-central Nebr., of the 13th generally in Iowa, S. Dak., east-central Colo., and southeast Mich.; of the 19th in central Nebr.; of the 24th generally in New England; and of the 25th in central and northern New York, was about seasonable. The killing frost of the 8th in west Colo., of the 24th in north N. J., of the 25th in southeast Pa., and of the 28th in central Mo. was about one week early; that of the 1st in northeast Pa., and of the 13th generally in Kans. was about 3 weeks early. The killing frost of the 8th in west-central Minn., of the 17th in western lower Mich., and of the 28th in central Ohio was about one week late; and that of the 13th in northeast Wis., that of the 20th in east-central Wis., and of the 27th in southeast Wis. was about 2 weeks late.

In the Atlantic coast states frost occurred as far south as west N. C. on the 18th; in the Ohio valley to central Ky. on the 14th; to extreme south Mo. on the 13th, 28th, and 29th; to central Tex. on the 29th and 30th; to central N. Mex. on the 13th and 28th; to south Utah on the 6th, 7th, and 8th; to

northern Nev. on the 7th; to west-central Nev. on the 2d; and to Centreville, Alameda Co., Cal., on the 2d. A comparison of the southern limit of frost for September, 1890, with that of the preceding month shows that it occurred about 1° farther south in the Atlantic coast states, 4° to 5° farther south in the central valleys, about 10° farther south on the southeast slope of the Rocky Mountains, about 5° farther south in the plateau region, and about 4° farther south on the Pacific coast.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for September, 1890, as determined from the reports of nearly 2,000 stations, is exhibited on chart III. In the table of Signal Service data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest monthly precipitation reported was 21.15 at Homeland, central Fla.; 19.55 was reported at Diamond, extreme north-central Ga., and more than 10.00 in northeast Ala., northeast Miss., south-central Tex., central and north-central Ark., north-central La., southwest Mo., west-central Ohio, south-central western N. Y., central and south-central Mass., and southern S. C. At Juneau, Alaska, the monthly precipitation was 17.11. At scattered stations in the Pacific coast states, the middle plateau region, and on the middle-eastern slope of the Rocky Mountains no precipitation was reported, and over the Rocky Mountain and plateau regions and along the Pacific coast, save on the northeast slope of the Rocky Mountains, and from northeast Cal. southeastward to eastern Ariz. and western N. Mex., the precipitation was less than 1.00. The precipitation was also less than 1.00 in areas in central and northeast Ill., the greater part of western Nebr. and southern S. Dak., southeast Wis., east-central lower Mich., and southeast Tex.

The precipitation was in excess of the average for September from the southeast slope of the Rocky Mountains eastward to the south Atlantic coast states and thence northeastward over the middle Atlantic states and New England to the Gulf of Saint Lawrence, over south Fla., and from the middle and south Pacific coasts northeastward over the upper Missouri valley. The precipitation was deficient from the upper lakes southwestward over the southern plateau, on the north Pacific coast, along the west Gulf coast, and in northeast Fla. The greatest excess in precipitation was reported on the south Atlantic coast, where it amounted to 11.35 at Charleston, S. C.; at Key West, Fla., the excess was 9.55; and from Ark. eastward to the south Atlantic coast, in southeast N. Y., and at Charlottetown, P. E. I., it was more than 4.00. The most marked deficiency was noted on the north Pacific coast, and in the lower Rio Grande valley, where it was more than 4.00, and there was a deficiency of more than 2.00 from the northern upper lakes west of south to central Ill., and in northeast Fla.

At the following-named stations the precipitation was the heaviest reported for September during the respective periods of observation. Albany, Palermo, Oswego, and Cooperstown, N. Y., Birdsnest, Va., Charleston, S. C., Augusta and Savannah, Ga., Key West, Fla., Fort Smith and Lead Hill, Ark., Memphis, Tenn., Indianapolis, Ind., North Lewisburgh and Columbus, Ohio, Saint Vincent, Minn., Fort Custer, Mont., Abilene, Tex., San Diego and Sacramento (vol. obs.), Cal.; and at Fort Elliott, Tex., Salt Lake City, Utah, Fort Canby, Neah Bay, Olympia, Fort Townsend, and Tatoosh Island, Wash., and Astoria and Albany, Oregon, it was the least ever reported for September.

Considered by districts, the average percentage of the normal in districts where the precipitation was in excess for September, 1890, was about as follows: New England and the south Atlantic states, 156 per cent.; middle Atlantic states, 155 per cent.; Key West, Fla., 243 per cent.; east Gulf states, 104 per cent.; west Gulf states, 126 per cent.; Ohio Valley and Tennessee, 188 per cent.; lower lake region, 145 per cent.; extreme northwest, 140 per cent.; southeast slope of the Rocky Mountains, 101 per cent.; southern plateau region, 113 per cent. On the middle Pacific coast the average precipitation for September is 0.33, and on the south Pacific coast 0.04, while for the current month the average in these districts was 0.89 and 0.36, respectively. In districts where the precipitation was deficient the percentage of the normal was about as follows: Rio Grande Valley, 15 per cent.; upper lake region, 44 per cent.; upper Mississippi valley, 73 per cent.; Missouri Valley, 70 per cent.; northeast slope of the Rocky Mountains, 64 per cent.; middle-eastern slope of the Rocky Mountains, 30 per cent.; middle plateau region, 50 per cent.; Spokane Falls, Wash., 68 per cent.; north Pacific coast, 9 per cent.

For the period January to September, 1890, inclusive, the precipitation on the middle Pacific coast averaged about $\frac{1}{3}$ greater, and in the west Gulf states, the Ohio Valley and Tennessee, and the lower lake region $\frac{1}{10}$ to $\frac{2}{10}$ greater than the average, while in the Rio Grande Valley, the Missouri Valley, the northeast and the middle-eastern slopes of the Rocky Mountains, and the middle plateau region it averaged $\frac{2}{3}$ to $\frac{3}{4}$ of the normal amount for the period named.

The heaviest precipitation reported for September occurred in central and eastern New York, on the south Atlantic coast, in central Texas, western Arkansas, western Tennessee, in the middle Ohio valley, and at Saint Vincent, Minn., Fort Custer, Mont., and San Diego, Cal., in 1890, when the excess in rainfall was more than 11.00 on the south Atlantic coast; over south New England, southeast New York, and north New Jersey in 1882, when the excess was more than 9.00; from the east part of the lower lake region to the Virginia coast in 1876, when the excess was 2.00 to 3.00; and from the middle Missouri valley to Lake Superior in 1881, when the excess was 5.00 to 8.00. The least precipitation ever noted for September occurred at Salt Lake City, Utah, Fort Elliott, Tex., and on the north Pacific coast in 1890, the deficiency being more than 4.00 on the coast of Washington; along the New England and middle Atlantic coast in 1884, when the deficiency was more than 4.00; on the south Atlantic coast in 1887, when the deficiency exceeded 5.00; on the east Gulf coast in 1883, when the deficiency exceeded 4.00; from the middle Missouri valley to Lake Superior in 1882, when the deficiency exceeded 2.00; and from west Iowa to east Texas in 1888, when the deficiency exceeded 3.00. On the middle and south Pacific coasts and over the southwest part of the southern plateau no rain fell in September for 4 years at Red Bluff, Cal., and Yuma, Ariz., for 5 years at Sacramento, San Francisco, and Los Angeles, Cal., and for 8 years at San Diego, Cal., since the establishment of Signal Service stations at those points. It will be seen that in 1890, when the greatest September rainfall recorded fell in widely-separated areas east of the Rocky Mountains and on the south Pacific coast, the least rainfall noted for September fell on the north Pacific coast, in north Texas, and north Utah. In 1882, when the heaviest rainfall for September fell in south New England, southeast New York, and north New Jersey, the rainfall was the least recorded for that month from the middle Missouri valley to Lake Superior. In 1877, when the heaviest rainfall for North Carolina was recorded, the amount in the lower Rio Grande valley was the least noted for September.